Tube coupling

Patent number: EP1178255

Publication date: 2002-02-06

Inventor: BRAMHALD PHILIP DAVID (GB); WRIGHT MICHAEL JONATHAN (GB)

Applicant: PEGLER LTD (GB)

Classification:

- international: ***F16L37/091;*** **F16L37/00;** (IPC1-7): F16L37/084

- european: F16L37/091

Application number: EP20010305497 20010625

Priority number(s): GB20000015867 20000628

Cited documents:

US4593943
EP1039204
US5437483
US5320326
WO9703314
more >>

Report a data error here

Abstract of **EP1178255**

A tube coupling apparatus including a body (4) which defines a tube receiving bore, the tube receiving bore being provided with a sealing element (6); a tube gripping means (10); and a release element (14) axially slidable within the bore, the release element (14) being engageable with the tube gripping means (10) so as to urge the tube gripping means (10) out of gripping engagement with the tube (22); wherein the apparatus further includes a retaining element (12) held, at least partially, within the bore, said retaining element (12) retaining the sealing element (6) and the tube gripping means (10) within the bore and restricting axial movement of the tube gripping means (10) within the bore.

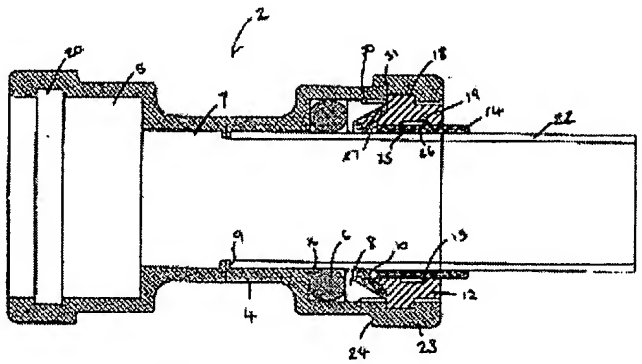

Fig 1

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 178 255 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.02.2002 Bulletin 2002/06

(51) Int Cl.[7]: **F16L 37/084**

(21) Application number: **01305497.8**

(22) Date of filing: **25.06.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **28.06.2000 GB 0015867**

(71) Applicant: **Pegler Limited**
Doncaster, South Yorkshire DN4 8DF (GB)

(72) Inventors:
- **Bramhald, Philip David**
  Bessacarr, Doncaster DN4 7AF (GB)
- **Wright, Michael Jonathan**
  Finningley, Doncaster DN9 3NZ (GB)

(74) Representative: **Coleiro, Raymond et al**
MEWBURN ELLIS York House 23 Kingsway
London WC2B 6HP (GB)

(54) Tube coupling

(57) A tube coupling apparatus including a body (4) which defines a tube receiving bore, the tube receiving bore being provided with a sealing element (6); a tube gripping means (10); and a release element (14) axially slidable within the bore, the release element (14) being engageable with the tube gripping means (10) so as to urge the tube gripping means (10) out of gripping engagement with the tube (22); wherein the apparatus further includes a retaining element (12) held, at least partially, within the bore, said retaining element (12) retaining the sealing element (6) and the tube gripping means (10) within the bore and restricting axial movement of the tube gripping means (10) within the bore.

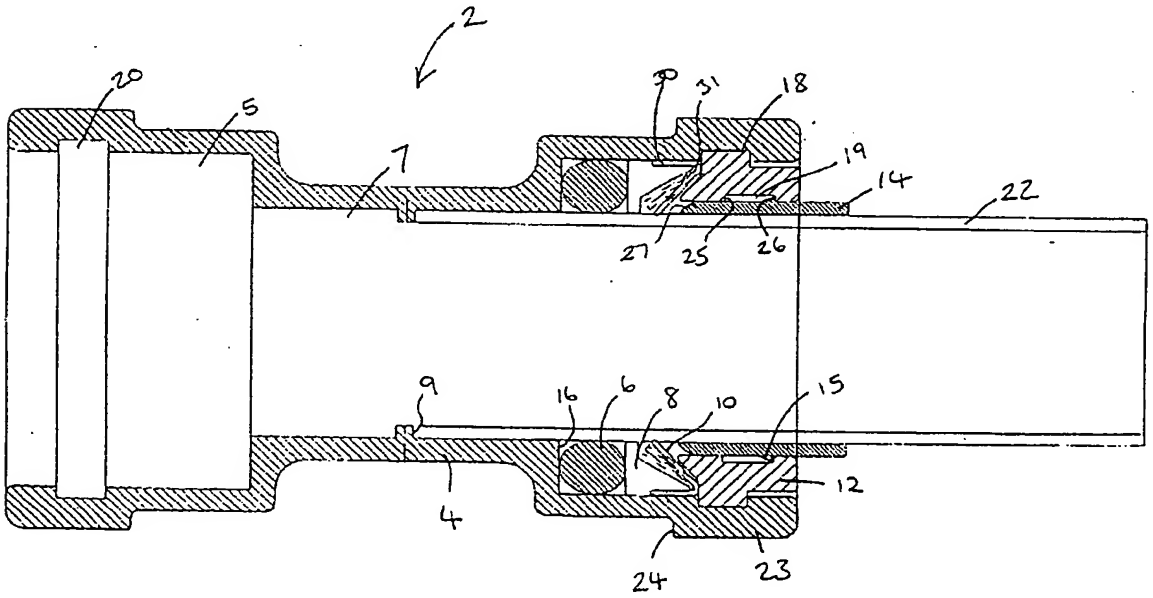

Fig 1

EP 1 178 255 A2

Description

[0001] The present invention relates to tube couplings, and particularly but not exclusively to releaseable push-fit tube couplings used for example in plumbing systems for connecting together water pipes.

[0002] Examples of push-fit tube coupling are known from WO 97/03314 and GB-A-2 306 131. These tube couplings include an axially slidable gripping element which fits around a tube within the coupling, the gripping element comprising an annular member which has a plurality of inclined tube gripping teeth which project into the tube coupling. In use, the internal pressure of the fluid in the tube causes the tube and the attached gripping element to be forced out of the tube coupling. Preventing this is a tapered cam arrangement at the entrance of the tube receiving bore such that as the fluid pressure tries to force the tube and gripping element out of the tube coupling, portions of the gripping element are urged against the tapered cam surface which increases the pressure exerted by the tube gripping teeth of the gripping element against the tube. This increases the grip on the tube to prevent its further withdrawal.

[0003] The tube may be released from the coupling by pushing the gripping element back into the coupling, away from the tapered cam surface, and maintaining it in that position, thereby reducing the grip of the tube gripping teeth on the tube and enabling the tube to be pulled out.

[0004] This type of arrangement where the tube gripping element moves axially within the tube coupling has a number of disadvantages associated with it. Firstly, it is more difficult to manufacture the coupling since the portion of the body housing the axially slidable tube gripping means needs to be of a greater diameter than the tapered cam surface at the entrance of the tube receiving bore. This requires expensive tooling and increases overall production costs. Alternatively, the tapered cam surface needs to be somehow affixed to the coupling at the entrance of the bore, which again leads to manufacturing, or at least assembly difficulties. Secondly, the ability of the tube gripping means to axially slide within the coupling and the interactions between the tube gripping means and the tapered cam surface can lead to wear of these components, necessitating disassembly of the tube from the coupling to enable replacement of the worn parts to take place. Thirdly, if it is desired to replace or service the O-ring seal within the coupling, it is disadvantageous that the tube gripping means cannot easily be removed to facilitate this. Thus, if it is desired to replace the O-ring seal, it is necessary to remove this and insert the new seal with both the tube gripping means and the tapered cam surface in place.

[0005] It is also known to provide push-fit tube couplings with an integral one-piece release means. Examples of this type of push-fit coupling are provided in GB-A-2 146 400 and WO 97/03314. However, these couplings are necessarily quite bulky, since the release means projects outside of the housing. Additionally, it is possible for the release means accidentally to be activated and thus permit undesired removal of the tube from the coupling.

[0006] In an attempt to overcome the problem of accidental operation of the release means, it is known to provide a detachable one-piece release member which is engageable with certain types of push-fit tube couplings. An example of this is known from WO 96/13685. However, it is often difficult to exert the necessary force to release the tube from the coupling using such detachable one-piece release members.

[0007] It is an aim of the present invention to overcome or at lease ameliorate at least some of the problems associated with the known types of push-fit tube couplings.

[0008] Thus, according to a first aspect of the present invention there is provided a tube coupling apparatus including a body which defines a tube receiving bore, the tube receiving bore being provided with a sealing element; a tube gripping means including a plurality of tube engaging teeth; and a release element axially slidable within the bore, the release element having a first surface which is engageable with the tube gripping means so as to urge the tube engaging teeth out of gripping engagement with the tube; characterised in that the apparatus further includes a retaining element to retain the seal and the tube gripping means within the bore and to fix the tube gripping means against axial movement within the bore. Preferably, the retaining element also retains at least a portion of the release element within the bore.

[0009] In a preferred embodiment, the release element includes a projecting portion which extends outside of the body. This projecting portion may be engaged by a release tool whereby the release element may be brought into engagement with the tube gripping means so as to urge the tube engaging teeth out of gripping engagement with the tube. This preferred arrangement of the release element means that the release tool does not need to have a shim portion capable of entering the bore between the body and the tube in order to engage the release element.

[0010] The retaining element preferably snap-fits within the bore, more preferably at least a portion of it snap-fits into a radially outwardly extending groove or channel in the body.

[0011] Once the retaining element has been snap-fitted in the coupling apparatus, it acts as a stop for the tube gripping means thereby preventing axial movement of the gripping means towards the open end of the bore. This in turn prevents axial movement of a tube, when retained within the coupling, towards the open end of the bore thereby preventing undesired or accidental withdrawal of the tube from the coupling.

[0012] The tube coupling apparatus may further include a stiffening element which cooperates with the tube gripping means by engaging a portion of the tube

gripping means thereby preventing radially inward movement of that portion. This preferred arrangement renders the tube gripping means stiffer and increases the gripping force which can be exerted by the tube engaging teeth to the tube.

[0013] The stiffening element, in preventing radially inward movement of a portion of the tube gripping means, retains the tube gripping means in a central position with respect to the tube receiving bore. By retaining the tube gripping means centrally, insertion of a tube into the coupling is made easier. Additionally, the stiffening element may be located between the sealing element and the tube gripping means, thus preventing the sealing element being damaged by the tube gripping means.

[0014] Each of the tube engaging teeth preferably includes an indented portion to engage in a more effective manner the curved periphery of the tube. The indented portion is preferably located substantially at the midpoint of the engagement surface of each of the teeth. In a preferred embodiment each of the teeth includes an engagement surface comprising an indented central portion and a convex outer portion on either side of the central portion.

[0015] The retaining element preferably cooperates with the release element to limit the axial movement of the release element within the bore. This may be achieved by providing the retaining element with an annular slot having opposed stop surfaces and providing the release element with a protrusion which is located within the slot such that axial movement of the release element is constrained by the opposed stop surfaces. This is achieved by the stop surfaces being capable of contacting the release element protrusion.

[0016] According to a second aspect of the present invention there is provided a tube release apparatus for use with the tube coupling apparatus according to the first aspect of the present intention, the tube release apparatus including a first release member including a contact surface for engagement with the release element of the tube coupling apparatus and a second release member engageable with the body of the tube coupling apparatus, both the first and second release members including a respective threaded portion for threaded engagement one with the other, whereby when in threaded engagement, rotation of one of the release members with respect to the other of the release members in a predetermined direction or sense causes engagement of the contact surface of the first release member with the release element of the tube coupling apparatus thereby urging the release element to engage the tube gripping means so as to urge the tube engaging teeth out of gripping engagement with the tube.

[0017] The second release member preferably includes a slot to permit it to be located coaxially with the tube. Additionally or alternatively, the first release member may include a slot to permit it to be located coaxially with the bore of the tube coupling apparatus.

[0018] In a preferred embodiment, the second release member includes a radially inwardly extending flange which is engageable with a complimentary shaped and sized radially outwardly extending flange provided on the body of the tube coupling apparatus thereby to prevent axial movement of the second release member towards the opening of the tube receiving bore upon operation of the tube release apparatus.

[0019] As will be appreciated, the first and second release members are usually brought out of threaded engagement with other and separated prior to engagement with the tube coupling apparatus and are then brought into threaded engagement one with the other in order to achieve the release of the tube from the tube coupling apparatus. The two release members may be connected one to the other in some suitable way, when they are not in threaded engagement with one another, to prevent one of the two members being lost.

[0020] According to a third aspect of the present invention, there is provided a method of releasing a tube from a tube coupling apparatus according to the first aspect of the present invention using a tube release apparatus according to the second aspect of the present invention, the method including locating the first release member coaxially with the bore of the tube coupling apparatus, locating the second release member coaxially with the tube, threadedly engaging the first release member with the second release member, rotating one of the release members with respect to the other release member until the contact surface of the first release member engages the release element of the tube coupling apparatus, continuing to rotate one of the release members with respect to the other thereby causing the release element to engage the tube gripping means so as to urge the tube engaging teeth out of gripping engagement with the tube, and removing the tube from the tube coupling apparatus.

[0021] Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 is a sectional view through a tube coupling in accordance with the present invention;

Figure 2 is an end view of the tube gripping means used in the coupling;

Figure 2a is an enlarged view of one of the teeth of the tube gripping means;

Figure 2b is a side elevational view of the tube gripping means;

Figure 3 is an end view of the retaining element used in the tube coupling;

Figure 3a is a side elevational view of the retaining element;

Figure 4 is a sectional view through the stiffening element used in the coupling;

Figure 5 is a sectional view through an alternative tube coupling;

Figure 6 is a sectional view through a first release member of the tube release apparatus according to the second aspect of the invention;

Figure 6a is an end view of the first release member;

Figure 7 is a sectional view through the second release member of the tube release apparatus according to the first aspect of the present invention;

Figure 7a is an end view of the second release member; and

Figure 8 is a sectional view through a tube coupling according to the first aspect of the invention having attached thereto a tube release apparatus according to the second aspect of the present invention.

[0022] Figure 1 shows an example of a tube coupling in accordance with the first aspect of the present invention. The tube coupling 2 comprises a hollow main body 4 which is substantially tubular in cross-section, has tube receiving bores at each end and has enlarged end regions 5 interconnected by a middle portion 7 of smaller diameter. The hollow main body 4 is made of brass and is used to join together two copper pipes, of which only one (tube 22) is shown in Figure 1.

[0023] Each enlarged end region 5 is provided with an O-ring seal 6, a stiffening element 8, a tube gripping ring 10, a release element 14 and a retaining element 12. For clarity, the tube coupling shown in Figure 1 only includes the tube coupling components in one end region thereof, the other end region being shown empty of these components. In use, both end regions will contain substantially identical components.

[0024] As can be seen in Figure 1, the O-ring seal 6 is prevented from moving axially towards the centre of the coupling 2 by a stop surface 16 and all of the components housed with the enlarged end region 5 are restrained against axial movement out of the coupling by the retaining element 12.

[0025] The retaining element 12 is made from acetal and includes a radially outwardly extending flange 18 which snap-fits into a complimentary groove 20 formed in the enlarged end region 5.

[0026] The retaining element 12 includes a groove 19 having a first stop surface 25 and a second stop surface 26. Within the groove 19 is located a radially outwardly extending projection 15 of the release element 14 such that axial movement of the release element 14 is constrained by the stop surfaces 25 and 26.

[0027] The release element 14 is made from brass and includes a tapered end surface 27 capable of engaging the gripping ring 10 to urge it out of engagement with the tube 22. Engagement of the tapered surface 27 with the gripping ring 10 is within the range of axial movement of the release element permitted by the stop surfaces 25 and 26 of the retaining element 12.

[0028] The gripping ring 10, as shown in more detail in Figures 2, 2a and 2b comprises a stainless steel annular portion 30 and extending radially inwardly therefrom a plurality of stainless steel teeth 32. As shown in more detail in Figure 2b, each of the teeth 32 also project out of the plane defined by the annular portion 30. Each tooth 32 includes two outer convex portions 36, 38 separated by an indented central portion 40.

[0029] The retaining element 12 (shown in Figures 3 and 3a) includes an annular portion 42 having six equally spaced projections 44 extending axially therefrom, with each of the projections 44 being separated from its neighbouring projections by gaps 46. Each projection 44 includes a radially outwardly projecting flange 18. The gaps 46 between the projections 44 permit limited radially inward movement of the resilient projections so that the flange 18 can enter the enlarged end region 5 of the tube receiving bore before it snap-fits into the groove 20 of the body 4.

[0030] Although in the specific embodiments described herein, the retaining element is not releasable from the tube coupling once it has been snap-fitted into position, other embodiments within the scope of the present invention may include a retaining element which is releasably retained within the coupling. Thus, the limited flexibility of the projections may also allow removal of the retaining element from the tube coupling by urging radially inwards the projections until the flange is out of engagement with the groove and the retaining element could then be withdrawn through the enlarged end region 5 of the tube receiving bore.

[0031] Once located in position, the retaining element 12 acts as a stop for the gripping ring 10. Thus, any forces exerted to the tube to withdraw it are transmitted to the gripping ring 10 and withdrawal of the gripping ring 10 is prevented by the retaining element 12. The resistive force exerted by the retaining element 12 is transmitted to the tube via the gripping ring 10 and prevents the tube being withdrawn.

[0032] The stiffening element 8 which is made from acetal is shown in more detail in Figure 4 and comprises a planar ring portion 50 having extending axially therefrom a portion providing a frusto-conical tapering surface 52 which when assembled within the body 4 faces the gripping ring 10. The stiffening element 8, together with the body 4 defines an annular channel between the inwardly facing surface of the body 4 and an outwardly facing surface 54 of the stiffening element. When assembled, the annular portion 30 of the gripping ring 10 is located within the annular channel defined by the body and surface 54. Since the annular portion 30 of the gripping ring 10 fits tightly within the channel defined by the

body 4 and the surface 54 of the stiffening element, the teeth 32 of the gripping ring 10 are restricted in their ability to move to a small range of pivotal movement about a hinge portion 31 of the gripping ring 10 between the ring portion 30 and the teeth 32. This pivotal movement is constrained between the frusto-conical surface 52 of the stiffening element 8 and a corresponding frusto-conical surface 45 of the retaining element 12.

[0033] In use, the tube 22 is pushed into the coupling, passing into a tube receiving bore 7. The tube urges the teeth 32 of the gripping ring 10 towards the frusto-conical surface 52 of the stiffening element 8 such that the tube may continue to pass the teeth 32 of the gripping ring 10. The tube also engages the O-ring seal 6 in a sealing manner. The tube is pushed in until it encounters a stop 9 in the body 4.

[0034] The resilience of the teeth 32 of the gripping ring 10 are such that the teeth dig into the outer surface of the tube to a certain extent. This resists any outward force on the tube 22 and prevents the tube being removed from the coupling.

[0035] Figure 5 shows a slightly alternative arrangement of the coupling which is modified to accept a more flexible multi-layered pipe. The tube coupling shown in Figure 5 is substantially identical to the tube coupling shown in Figure 1, but with the additional components described below.

[0036] Prior to a multi-layered pipe 122 being inserted into the coupling 2, a brass insert 104 is inserted into the free end of the tube 122. The insert 104 comprises a generally tubular body 103 having a tapered end portion 110 at one end and a radially outwardly extending flange portion 113 at the other end. There is a channel 114 provided in the flange 113 arranged to receive an O-ring seal 106. The channel 114 includes stop surfaces 105 and 107 to prevent axial movement of the O-ring seal 106. Abutting a surface 118 of the flange 113 is a PTFE insulating washer 112. The internal diameter of the insulating washer 112 is configured to be a tight fit around the outwardly facing surface of the insert body 103. Towards the tapered end portion of the insert is provided a second O-ring seal 108 housed within a channel 116 including a pair of stop surfaces 109 and 111, the channel 116 being sized such that the stop surfaces 109 and 111 restrain the O-ring seal 108 against axial movement.

[0037] The tapered portion 110 of the insert allows for easy insertion into the free end of the tube 122 and the insert is inserted into the tube until the end surface of the tube 122 engages the insulating washer 112. When in this position, the O-ring seal 108 is in sealing engagement with the tube 122. The flange 113 of the insert 104 is arranged such that the outer diameter of the flange 113 is substantially identical to the outer diameter of the tube 122.

[0038] The insert is sized such that it is a tight fit within the tube 122. That is to say an outwardly facing surface 120 of the insert body 103 engages an inwardly facing surface 121 of the tube 122 in such a way as to prevent the tube walls moving radially inwards.

[0039] The tube 122, together with the inserted insert 104 is then pushed into the coupling 2 in the same way as described above for the copper tube with respect to the first embodiment of the present invention. The insert 104 prevents radially inward movement of the tube 122 in the area where the teeth 32 of the gripping ring 10 engage the tube 122. Thus, the insert permits the teeth 32 of the gripping 10 to engage the tube 122 by digging into its outer surface and thereby prevent undesired removal of the tube 122 from the coupling 2.

[0040] Once inserted into the tube coupling 2, the O-ring seal 106 engages an inwardly facing surface of the body 4 in a sealing manner, to provide a fluid seal within the coupling 2 in addition to the O-ring seal 6.

[0041] Figures 6 and 6a show the first member 202 of a two-part release tool 200 and Figures 7 and 7a show the second member 212 of the two-part release tool 200. Figure 8 shows the two members 202, 212 of the release tool 200 engaged one with the other located in position on the tube coupling 2 as described above.

[0042] The first member 202 of the release tool 200 consists of a generally cylindrical body 201 having a slot 204 therein. The width of the slot 204 being slightly smaller than the diameter of the tube 122 about which it may be placed so that the first member 202 snap fits about the tube. The slot 204 ends in a curved portion 205, arranged such that the curved portion 205 has a radius about the axis of the body 201 which is just slightly greater than the radius of the tube 122 about its axis. This arrangement allows for the first release member 202 to be located coaxially about the tube 122.

[0043] The body 201 further includes a substantially planar annular contact surface 206 and an internal threaded portion 208.

[0044] The second member 212 of the release tool 200 consists of a substantially C-shaped body 211 defining a channel 214. The body 211 has a degree of flexibility which allows it to snapfit over a portion 230 of the coupling 2, the channel 214 being sized to receive this portion 230 of the tube coupling 2.

[0045] The second release member 212 further includes an engagement surface 216 and a radially outwardly projecting threaded portion 218.

[0046] Attachment of the release tool 200 to the tube coupling 2 is shown in Figure 8 and described below.

[0047] The second release tool member 212 snap fits over the portion 230 of the tube coupling 2 such that the engagement surface 216 of the second release tool member 212 engages the stop surface 24 of the coupling body 4. The first release tool member 202 is then arranged coaxially with the tube 122 and moved axially towards the second release tool member 212 until the threaded portion 208 of the first member 202 contacts the complimentary threaded portion 218 of the second member 212. The second release tool member 212 is then held stationery while the first release tool member

is rotated in a clockwise sense relative to it such that the threaded portion 208 threadedly engages the threaded portion 218 and a portion of the contact surface 206 of the first release tool member 202 engages an end surface 220 of the release element 14. Continued rotation of the first release tool member 202 with respect to the second release tool member 212 urges the release element 14 into engagement with the teeth 32 of the gripping ring 10, the tapered end surface of the release element 14 urging the teeth 32 out of gripping engagement with the outer surface of the tube 122, thus permitting removal of the tube 122 from the coupling 2.
These preferred embodiments have been described by way of an example and it will be apparent to those skilled in the art that many alterations can be made that are still within the scope of the invention.

Claims

1. A tube coupling apparatus including a body which defines a tube receiving bore, the tube receiving bore being provided with a sealing element; a tube gripping means; and a release element axially slidable within the bore, the release element being engageable with the tube gripping means so as to urge the tube gripping means out of gripping engagement with the tube; **characterised in that** the apparatus further includes a retaining element held, at least partially, within the bore, said retaining element retaining the sealing element and the tube gripping means within the bore and restricting axial movement of the tube gripping means within the bore.

2. A tube coupling apparatus according to claim 1, wherein at least a portion of the release element is held within the bore by the retaining element.

3. A tube coupling apparatus according to either of claims 1 or 2, wherein, when the tube is inserted in the coupling, at least a portion of the release element is held between the retaining element and the tube.

4. A tube coupling apparatus according to any one of the preceding claims, wherein the retaining element cooperates with the release element to limit the axial movement of the release element within the bore.

5. A tube coupling apparatus according to any of the preceding claims, wherein the retaining element restricts axial movement of the release element.

6. A tube coupling apparatus according to claim 5, wherein the retaining element is provided with an annular slot having opposed stop surfaces and in that the release element is provided with a protrusion which is located within the slot such that axial movement of the release element is restricted by contact between the protrusion and the opposed stop surfaces.

7. A tube coupling apparatus according to any one of the preceding claims, wherein the release element includes a projecting portion which extends axially outside the body, the release element being capable of being moved by an external force applied to the axially projecting portion so that the release element is brought into engagement with the tube gripping means thereby urging the tube engaging teeth out of gripping engagement with the tube.

8. A tube coupling apparatus according to any one of the preceding claims, wherein the retaining element is held within the bore by mechanically interlocking means.

9. A tube coupling apparatus according to any one of claims 1 to 6, wherein the retaining element snap-fits within the bore.

10. A tube coupling apparatus according to claim 6, wherein at least a portion of the retaining element snap-fits into a radially outwardly extending groove or channel in the body, thereby acting as a stop for the tube gripping means so as to prevent axial movement of the gripping means and therefore also the tube, when retained within the coupling, towards the open end of the bore, thereby preventing withdrawal of the tube from the coupling.

11. A tube coupling apparatus according to any one of the preceding claims, wherein the apparatus further includes a stiffening element which engages a portion of the tube gripping means rendering the tube gripping means stiffer and increasing the gripping force exerted by the tube engaging teeth against the tube, when the tube is in its inserted position within the coupling.

12. A tube coupling apparatus according to claim 11, wherein the stiffening element engages a portion of the tube gripping means so as to oppose radially inward movement of that portion, rendering the tube gripping means stiffer.

13. A tube coupling apparatus according to either of claims 11 or 12, wherein the stiffening element, in preventing radially inward movement of a portion of the tube gripping means, retains the tube gripping means in a central position with respect to the tube receiving bore so as to make insertion of a tube into the coupling easier.

14. A tube coupling apparatus according to any one of claims 11 to 13, wherein the stiffening element is located between the sealing element and the tube gripping means, so as to protect the sealing element from being damaged by the tube gripping means.

15. A tube coupling apparatus according to any one of the preceding claims, wherein the gripping means consists of a gripping ring which includes an axially extending ring portion, a plurality of teeth and a hinge portion, located between the ring portion and the teeth, so as to permit pivotal movement of the teeth relative to the ring portion.

16. A tube coupling apparatus according to claim 15, wherein the stiffening element engages the axially extending ring portion so as to urge the ring portion against the inner wall of the bore.

17. A tube coupling apparatus according to claim 16, wherein the stiffening element includes a tapered surface which restricts the pivotal movement of teeth.

18. A tube coupling apparatus according to claim 17, wherein the retaining element includes a tapered surface which together with the tapered surface of the stiffening element restrict the range of pivotal movement of the teeth.

19. A tube release apparatus for use with a tube coupling apparatus having a release element, the tube release apparatus including a first release member including a contact surface for engagement with the release element of the tube coupling apparatus and a second release member engageable with the body of the tube coupling apparatus, both the first and second release members including a respective threaded portion so as to be capable of threaded engagement with each other, whereby when in threaded engagement, rotation of one of the release members with respect to the other of the release members in a predetermined direction or sense is capable of causing the contact surface of the first release member to engage the release element of the tube coupling apparatus thereby urging the release element to engage the tube gripping means so as to urge the tube gripping means out of gripping engagement with the tube.

20. A tube release apparatus according to claim 19, wherein the first release member includes a generally annular portion and an opening capable of receiving the tube so that it is capable of being located coaxially with the tube.

21. A tube release apparatus according to claim 19, wherein the second release member includes a generally annular portion and an opening so that it is capable of being located coaxially with the bore of the tube coupling apparatus.

22. A tube release apparatus according to claim 19, wherein the second release member includes a radially inwardly extending flange which is engageable with a complimentary shaped and sized radially outwardly extending flange provided on the body of the tube coupling apparatus so as to be capable of preventing axial movement of the second release member towards the open end of the tube receiving bore upon operation of the tube release apparatus.

23. A tube release apparatus according to any one of claims 19 to 22 for use with a tube coupling apparatus according to any one of claims 1 to 18.

24. A method of releasing a tube from a tube coupling apparatus according to any one of claims 1 to 18 using a tube release apparatus according to any one of claims 19 to 23, the method including locating the first release member coaxially with the tube, locating the second release member coaxially with the bore of the tube coupling apparatus, threadedly engaging the first release member with the second release member, rotating one of the release members with respect to the other release member until the contact surface of the first release member engages the release element of the tube coupling apparatus, continuing to rotate one of the release members with respect to the other release member, thereby causing the release element to engage the tube gripping means so that the tube gripping means is urged out of gripping engagement with the tube, thereby releasing the tube so that it can be removed from the tube coupling apparatus.

25. A method of releasing a tube from a tube coupling apparatus according to claim 24 wherein, before being brought into threaded engagement with one another to release the tube from the tube coupling apparatus, the first and second release members are separate from one another.

26. A method of releasing a tube from a tube coupling apparatus according to claim 25 wherein, the first and second release members are connected together to maintain the two members as a connected pair when they are not in threaded engagement with one another.

27. Use of a tube coupling apparatus as described in any one of claims 1 to 18 to connect the end of a heating pipe to a radiator.

28. Use of a tube coupling apparatus as described in

any one of claims 1 to 18 to connect the end of one heating pipe to the ends of two further heating pipes in a substantially 'T' shaped configuration.

29. Use of a tube coupling apparatus as described in any one of claims 1 to 18 to connect the end of a heating pipe to the end of a further heating pipe in a substantially 'L' shaped configuration.

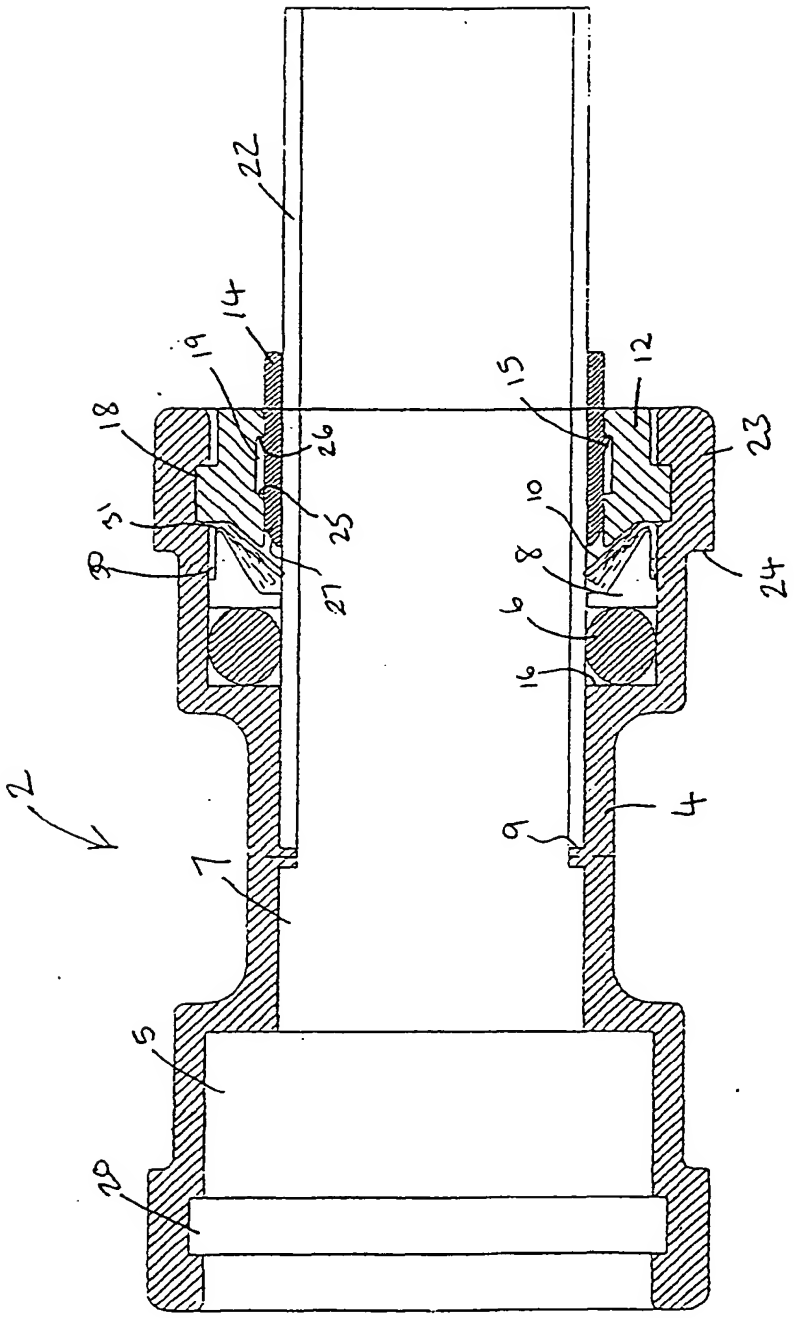

Fig 1

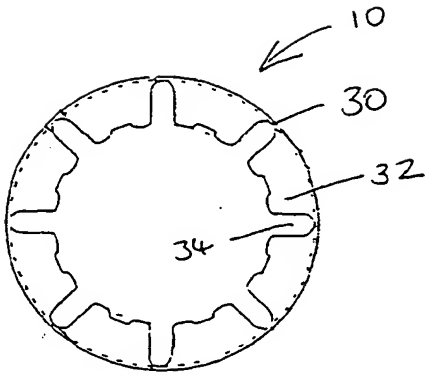

Fig 2

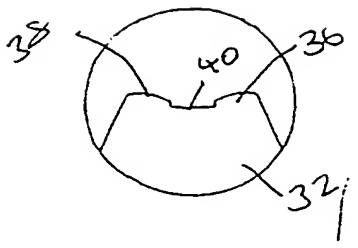

Fig 2A

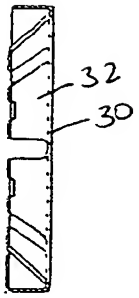

Fig 2B

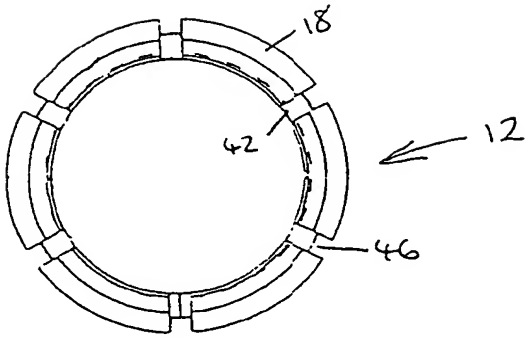

Fig3

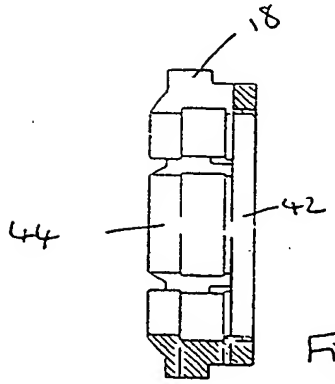

Fig 3A

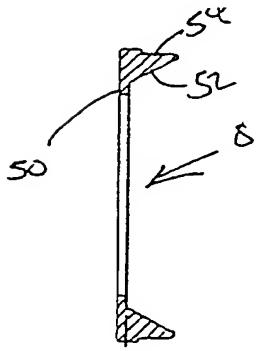

Fig 4

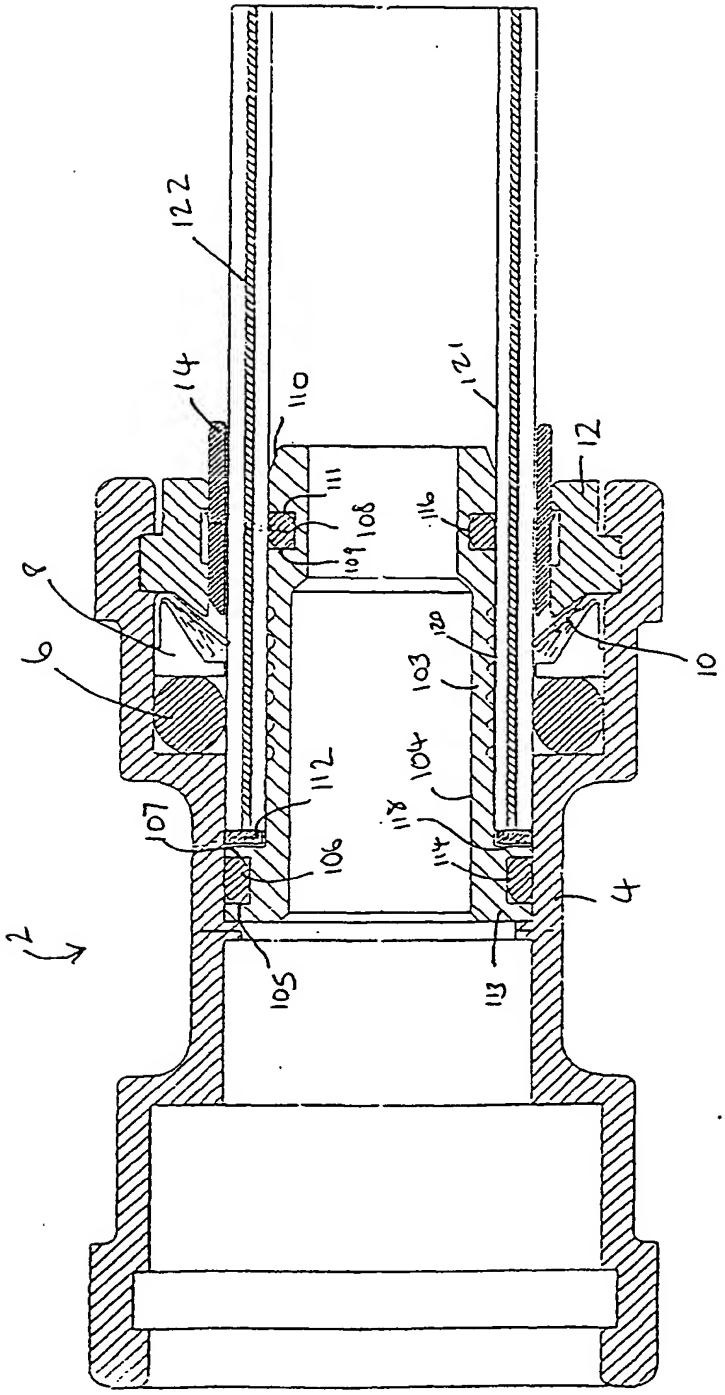
122
14
110
121
12
111
108
109
116
8
9
120
103
10
112
104
107
118
106
114
4
2
105
113

Fig 5

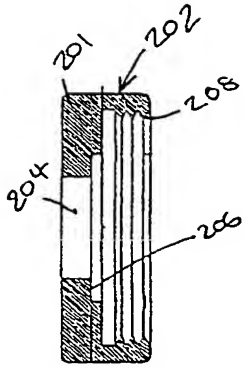

Fig 6

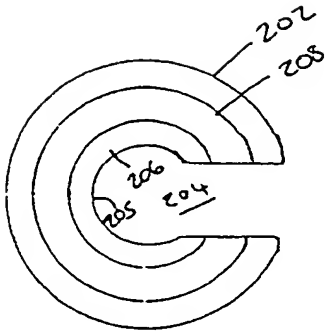

Fig 6A

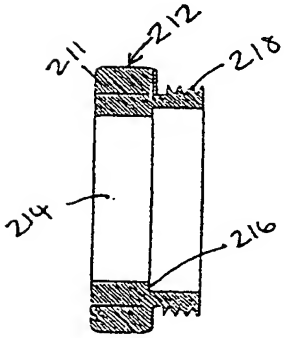

Fig 7

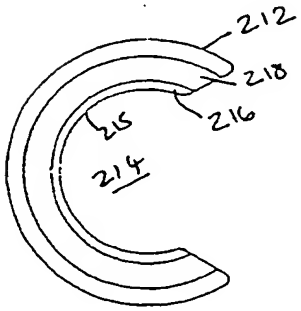

Fig 7A

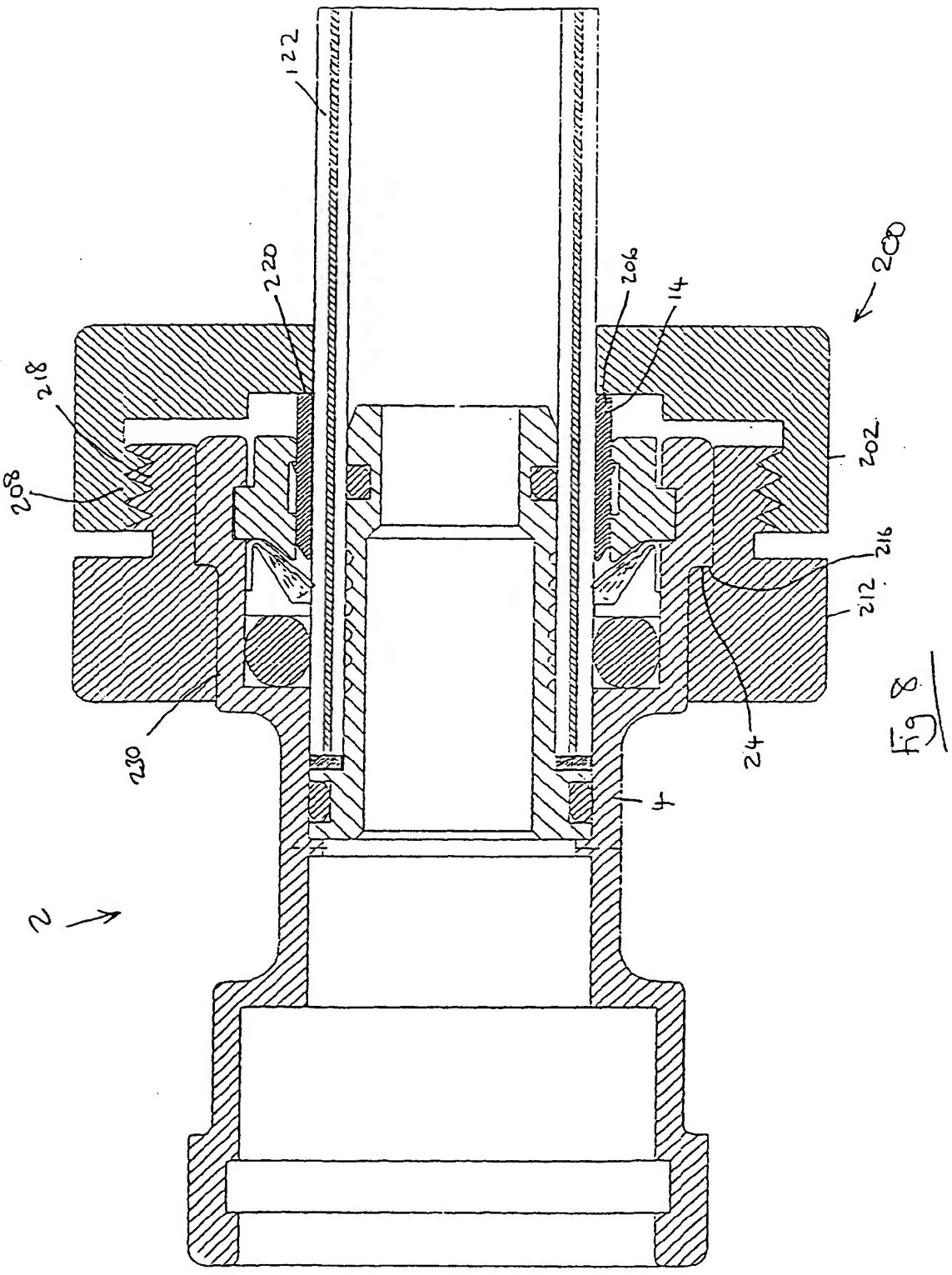

Fig 8

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 178 255 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
02.01.2003 Bulletin 2003/01

(43) Date of publication A2:
06.02.2002 Bulletin 2002/06

(21) Application number: **01305497.8**

(22) Date of filing: **25.06.2001**

(51) Int Cl.7: **F16L 37/084**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **28.06.2000 GB 0015867**

(71) Applicant: **Pegler Limited**
Doncaster, South Yorkshire DN4 8DF (GB)

(72) Inventors:
- **Bramhald, Philip David**
  Bessacarr, Doncaster DN4 7AF (GB)
- **Wright, Michael Jonathan**
  Finningley, Doncaster DN9 3NZ (GB)

(74) Representative: **Coleiro, Raymond et al**
MEWBURN ELLIS
York House
23 Kingsway
London WC2B 6HP (GB)

(54) Tube coupling

(57) A tube coupling apparatus including a body (4) which defines a tube receiving bore, the tube receiving bore being provided with a sealing element (6); a tube gripping means (10); and a release element (14) axially slidable within the bore, the release element (14) being engageable with the tube gripping means (10) so as to urge the tube gripping means (10) out of gripping engagement with the tube (22); wherein the apparatus further includes a retaining element (12) held, at least partially, within the bore, said retaining element (12) retaining the sealing element (6) and the tube gripping means (10) within the bore and restricting axial movement of the tube gripping means (10) within the bore.

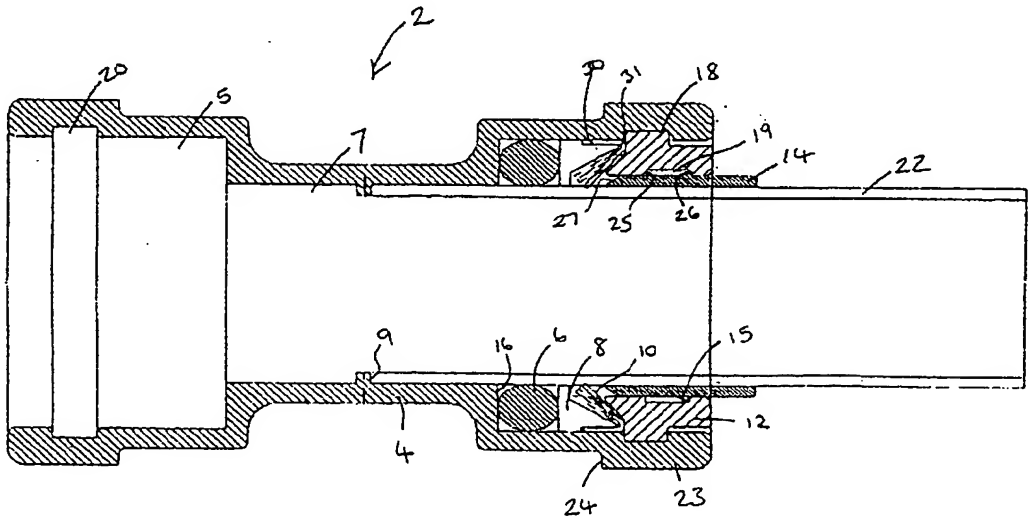

Fig 1

EP 1 178 255 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 30 5497

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	US 4 593 943 A (HAMA TOMIO ET AL) 10 June 1986 (1986-06-10) * column 3, line 39 - column 4, line 32; figures 1-4 *	1-5 6-9	F16L37/084
P,X	EP 1 039 204 A (DELTA CAPILLARY PROD LTD) 27 September 2000 (2000-09-27) * column 3, line 7 - column 4, line 12; figures 1,2 *	1-5	
Y	US 5 437 483 A (UMEZAWA KATSUSHI) 1 August 1995 (1995-08-01) * column 3, line 14 - line 60; figures 1,2 *	6-9, 19-26	
Y	US 5 320 326 A (HER YIH-CHING ET AL) 14 June 1994 (1994-06-14) * column 2, line 60 - column 3, line 10; figures 2-4 *	19-26	
A,D	WO 97 03314 A (MARLEY EXTRUSIONS ;DUDLEY STEVEN JOHN (GB)) 30 January 1997 (1997-01-30) * page 9, line 15 - page 10, line 13 * * page 11, line 12 - page 12, line 20 * * figures 3,4,6,9,11,12 *	1-18, 27-29	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F16L
A	GB 2 160 279 A (HAWKE CABLE GLANDS LTD) 18 December 1985 (1985-12-18) * page 3, line 17 - page 4, line 30; figure 2 *	1-18, 27-29	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	1 November 2002	Mauriès, L

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 30 5497

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-11-2002

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 4593943	A	10-06-1986	JP	1513102 C	24-08-1989
			JP	60044683 A	09-03-1985
			JP	63057676 B	11-11-1988
			JP	1573247 C	20-08-1990
			JP	60044684 A	09-03-1985
			JP	63029156 B	13-06-1988
			US	4747626 A	31-05-1988
EP 1039204	A	27-09-2000	CA	2300730 A1	19-09-2000
			EP	1039204 A2	27-09-2000
			GB	2349930 A	15-11-2000
US 5437483	A	01-08-1995	JP	6074381 A	15-03-1994
US 5320326	A	14-06-1994	NONE		
WO 9703314	A	30-01-1997	AU	715406 B2	03-02-2000
			AU	6314096 A	10-02-1997
			CZ	9800023 A3	16-09-1998
			EP	0838006 A1	29-04-1998
			WO	9703314 A1	30-01-1997
			GB	2317212 A ,B	18-03-1998
			GB	2336638 A ,B	27-10-1999
			HU	9900135 A2	28-04-1999
			NZ	311760 A	28-01-2000
			PL	324482 A1	25-05-1998
			ZA	9605680 A	13-08-1997
GB 2160279	A	18-12-1985	IT	1184608 B	28-10-1987
			NO	852371 A	16-12-1985
			US	4630848 A	23-12-1986

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82